Accuracy Evaluation of the Landsat 7 ACCA Algorithm

Richard Irish
Landsat Project Science Office
Goddard Space Flight Center

Operational Procedure

- **The Landsat Processing System performs ACCA on every image prior to archiving**
- **Cloud cover scores (percentages) are tabulated and reported on a quarter scene and full scene basis**
- **Cloud cover scores are recorded in scene metadata records**

Purpose

- **ACCA scores are available to users for identifying candidate imagery**
- **Cloud cover scores are referenced daily by the Mission Operations Center to determine image acquisition success or failure (based on long term acquisition plan criteria)**

Evaluation Procedure

- **32 daylight WRS locations were generated randomly across space and time**

- **Browse imagery and ACCA scores were extracted from the archive**

- **A variety of Adobe Photoshop tools were used to generate binary cloud masks from each of the browse images**

- **Histograms of the cloud masks yielded the cloud mask percentages**

- **The cloud mask scores were compared against the ACCA scores and summarized**

Cloud Mask Generation

Browse Image
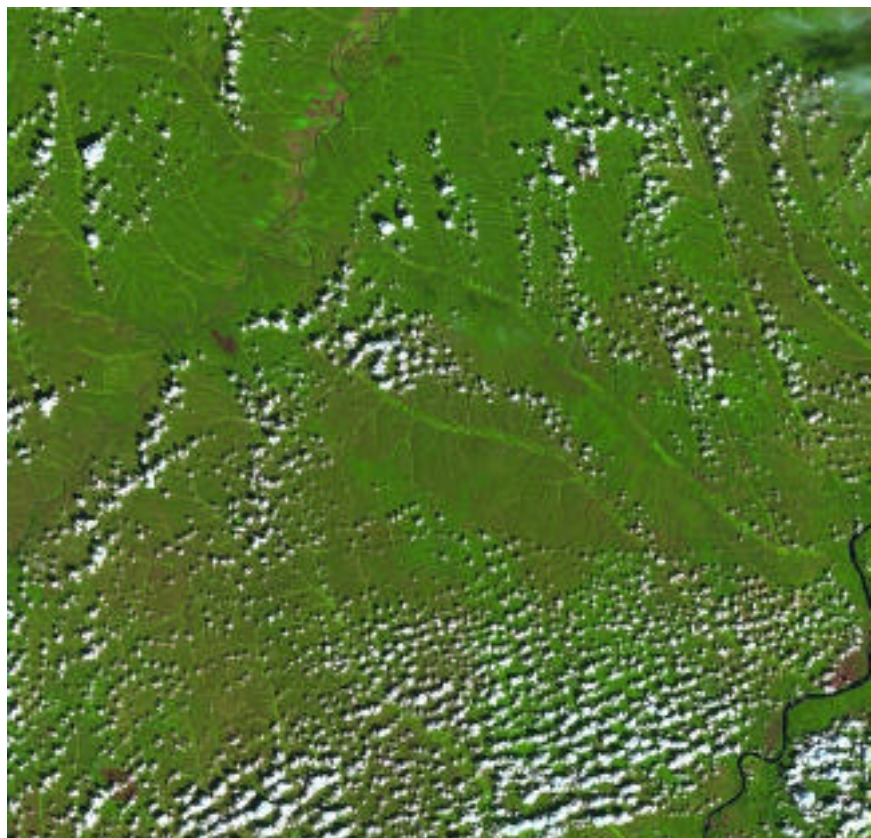
Photoshop Mask

Of the 32 images examined:

- 16 (50%) were within 5%
- 24 (75%) were within 10%
- 28 (88%) were within 15%
- 29 (91%) were within 20%
- 3 images differed by more than 20%

Assuming the mask is truth:

- ACCA over reported in 13 cases
- ACCA under reported in 16 cases
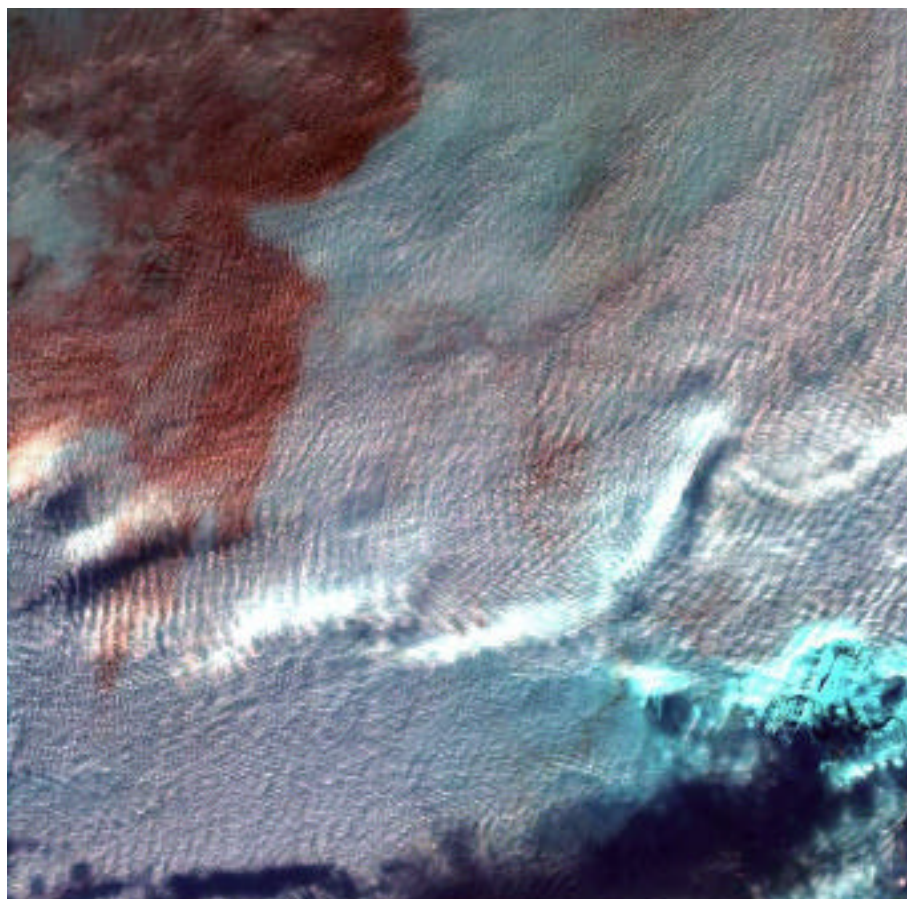- ACCA and the mask were the same in 3 cases

USGS science for a changing world

NASA

Northern Siberia

Anomalous
Image # 1

ACCA Score: 78%

Mask Score: 99%

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NASA

Eastern Antarctica
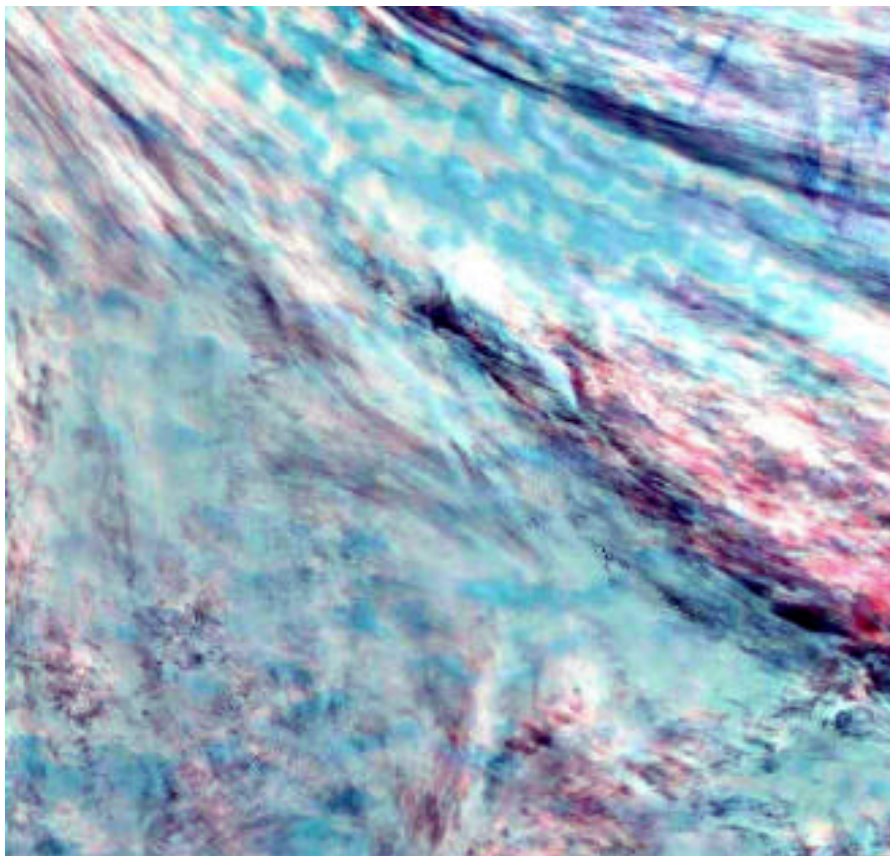
**Anomalous
Image # 2**

ACCA Score : 0%

Mask Score: 56%

USGS
science for a changing world

NASA
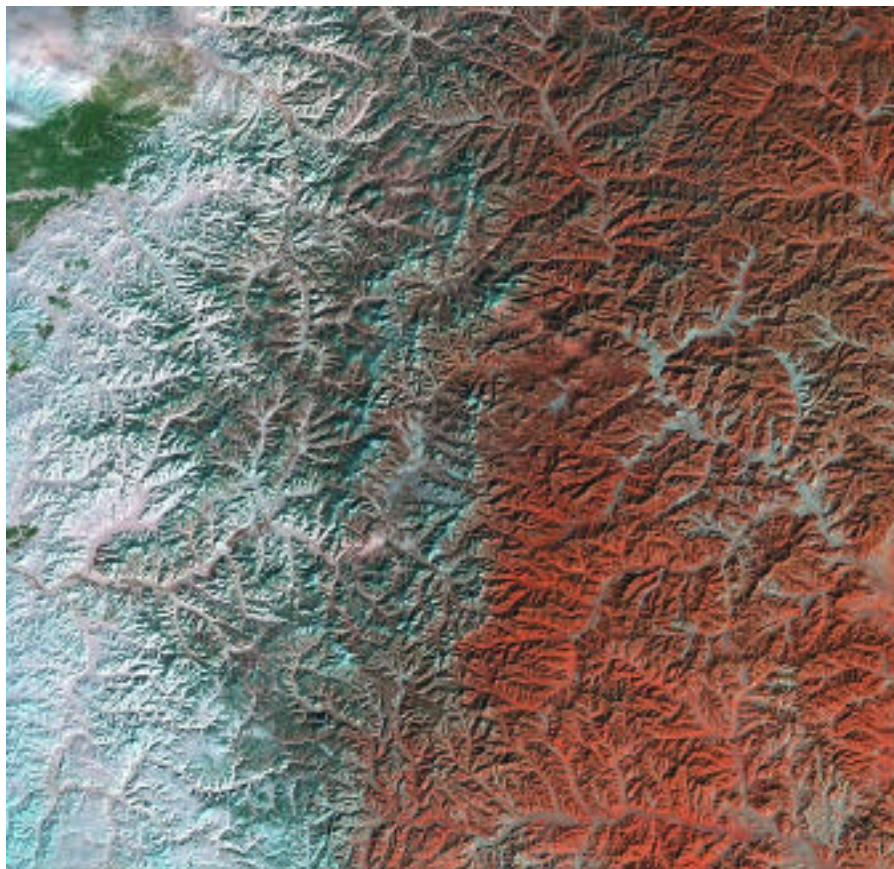
Inner Mongolia

**Anomalous
Image # 3**

ACCA Score : 31%

Mask Score: 0%

Inner Mongolia
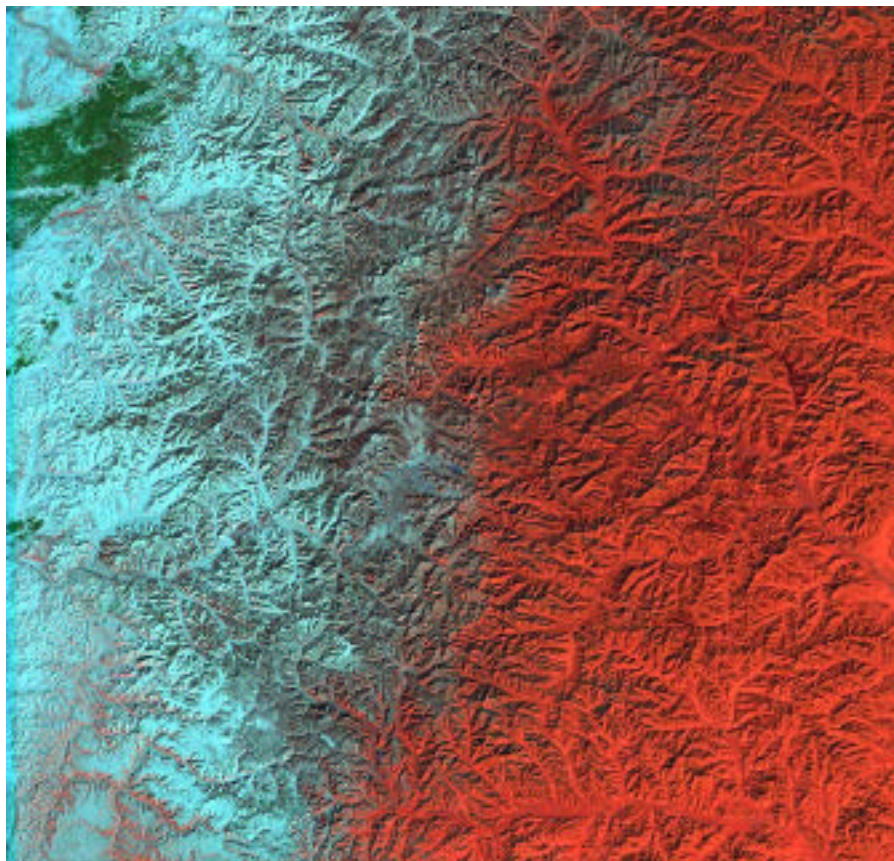
ACCA Score : 0%

Mask Score: 0%

Assuming the mask is truth:

- ACCA over reported in 13 cases
- ACCA under reported in 16 cases
- ACCA and the mask were the same in 3 cases

ACCA vs mask scores (30 of 32 images)

- Mean difference: 0.067
- Standard deviation: 8.39

Conclusions

- ACCA, in most cases, appears to be working as designed.

- Where ACCA failed, snow was clearly involved

- The ACCA algorithm was based on the Landsat 5 pre-launch calibration, thus, results are very encouraging

- Analysis of the 2 failed scenes is underway. Pre-launch tests indicated successful snow-cloud discrimination. A simple parameter change in the CPF may provide the appropriate fix

- Future ACCA assessments will be performed to ensure algorithm stability